

UNITED STATES NAVAL OBSERVATORY

CIRCULAR NO. 129

U. S. Naval Observatory, Washington, D. C. 20390

April 2, 1971

Annular Solar Eclipse of 16 January 1972

by

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GENERAL INFORMATION

The path of the annular phase of the solar eclipse of 16 January 1972 touches the earth in the South Pacific Ocean just north of the Ruppert Coast of Antarctica. The path enters Antarctica between the Edsel Ford Range and the Edward VII Peninsula at $10^{\text{h}} 28^{\text{m}}$ U.T. when it is 242 miles wide and the duration is $1^{\text{m}} 54^{\text{s}}.2$. At local apparent midnight ($10^{\text{h}} 32^{\text{m}}.5$ U.T.) the path begins to cross the Ross Ice Shelf, and next passes over the Queen Alexandra Range and Wilkes Land. The path leaves Antarctica along the Knox Coast at $11^{\text{h}} 20^{\text{m}}$ U.T. when the duration is $1^{\text{m}} 50^{\text{s}}.5$ and the width is 258 miles. The path leaves the earth at sunset in the Indian Ocean between Antarctica and southwestern Australia.

Partial phases of the eclipse of greater or less magnitude, decreasing with the distance from the path of annular phase, will be visible over the southern tip of South America, Antarctica, the extreme southwestern tip of Australia, the South Pacific Ocean, the South Atlantic Ocean, and the southern part of the Indian Ocean.

The predictions in this *Circular* are derived from the basic data in the American Ephemeris and Nautical Almanac for the Year 1972. The arguments are in Universal Time, and the longitudes west of Greenwich are positive. The solar ephemeris was referred to the same equinox as the lunar ephemeris by applying a provisional correction of 1.34 seconds. The value of ΔT , used in the computations, is 40.6 seconds ($41^{\text{s}}.94 - 1^{\text{s}}.34 = 40^{\text{s}}.6$).

The value of 0.2724880 for k has been used in these calculations. In the local circumstances, the angle P is the position angle of the point of contact, measured eastward from the north point of the solar limb, and the angle V is the position angle of the point of contact, measured eastward from the vertical circle. The duration, tabulated in the local circumstances, is derived from the second and third contacts.

The circumstances of the eclipse were plotted by the Nautical Almanac Office on a portion of the U. S. Navy Operation "Deep Freeze 70" 1969-70 Chart H. O. 2562-D of the U. S. Naval Oceanographic Office.

GENERAL INFORMATION (Continued)

This *Circular* contains the following information: The Eclipse Map from the American Ephemeris and Nautical Almanac, p. 4; The Path of the Annular Phase, p. 5; The Central Line, Duration and Width of Path at 10,000 feet, 20,000 feet, 30,000 feet, and 40,000 feet, pp. 6,7; The Central Line, Duration and Width of Path at 80 km, 100 km, 200 km, and 300 km, pp. 8,9; Local Circumstances for Points on the Central Line, pp. 10,11; Local Circumstances for Geographic Locations for both Annular and Partial Phase, pp. 12,13; Map of the Path, p. 15.

It is requested that precise observations of contact times of this eclipse and the coordinates of the place of observation be reported to

The Nautical Almanac Office,
U. S. Naval Observatory,
Washington, D. C. 20390
U. S. A.

ANNULAR SOLAR ECLIPSE OF 16 JANUARY 1972

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PATH OF THE ANNULAR PHASE

Universal Time h m Limit	Northern Limit		Central Line		Southern Limit	
	Latitude ° ' "	Longitude ° ' "	Latitude ° ' "	Longitude ° ' "	Latitude ° ' "	Longitude ° ' "
	-68 16	+138 10	-68 37	+143 16	-68 51	+148 54
10 25	-76 20.7	+137 14.8	-70 30.8	+142 35.2	.. ..	.. ..
26	77 34.7	138 13.9	73 29.7	142 37.6	.. ..	.. ..
27	78 40.0	139 33.5	75 15.7	143 30.4	.. ..	.. ..
28	79 38.6	141 14.5	76 38.5	144 49.8	.. ..	.. ..
29	80 31.9	143 18.9	77 48.1	146 32.0	-73 12.3	+149 15.1
10 30	-81 20.4	+145 49.8	-78 48.6	+148 37.0	-75 02.6	+150 45.5
32	82 44.5	152 26.1	80 29.5	154 00.0	77 30.7	155 00.7
34	83 51.3	161 37.4	81 48.2	161 12.3	79 14.9	160 44.4
36	84 38.4	+173 46.3	82 46.7	+170 23.9	80 31.2	167 56.9
38	85 02.5	-171 37.6	83 24.2	-178 35.6	81 24.5	+176 32.6
10 40	-85 02.5	-156 26.0	-83 40.3	-166 32.2	-81 56.5	-173 49.9
42	84 41.0	142 54.0	83 35.8	154 39.6	82 08.3	163 49.2
44	84 03.9	132 09.3	83 14.0	144 04.6	82 02.2	154 11.2
46	83 16.6	124 06.2	82 39.0	135 18.7	81 41.0	145 32.2
48	82 23.2	118 10.1	81 55.0	128 21.1	81 08.3	138 09.4
10 50	-81 26.3	-113 47.0	-81 04.7	-122 55.7	-80 27.0	-132 04.2
52	80 27.2	110 30.6	80 10.5	118 43.2	79 39.5	127 08.1
54	79 26.9	108 02.5	79 13.6	115 26.8	78 47.8	123 10.1
56	78 25.9	106 09.8	78 15.1	112 53.5	77 53.0	119 59.3
58	77 24.5	104 43.8	77 15.3	110 53.6	76 56.0	117 26.4
11 00	-76 22.9	-103 38.3	-76 14.8	-109 19.6	-75 57.4	-115 24.1
02	75 21.1	102 48.8	75 13.6	108 06.3	74 57.6	113 46.5
04	74 19.2	102 12.3	74 12.1	107 09.7	73 56.8	112 29.2
06	73 17.3	101 46.2	73 10.1	106 26.7	72 55.2	111 28.8
08	72 15.1	101 29.0	72 07.7	105 55.2	71 52.9	110 42.5
11 10	-71 12.8	-101 19.4	-71 04.9	-105 33.6	-70 49.8	-110 08.4
12	70 10.3	101 16.3	70 01.7	105 20.5	69 46.0	109 45.0
14	69 07.4	101 19.3	68 57.9	105 15.0	68 41.3	109 31.2
16	68 04.1	101 27.6	67 53.5	105 16.5	67 35.7	109 26.1
18	67 00.2	101 41.0	66 48.3	105 24.6	66 29.0	109 29.3
11 20	-65 55.6	-101 59.4	-65 42.1	-105 39.1	-65 20.9	-109 40.5
22	64 50.1	102 22.7	64 34.8	105 59.9	64 11.2	109 59.9
24	63 43.6	102 51.1	63 26.1	106 27.2	62 59.4	110 27.9
26	62 35.8	103 24.8	62 15.5	107 01.4	61 45.1	111 05.2
28	61 26.3	104 04.2	61 02.7	107 43.4	60 27.3	111 53.4
11 30	-60 14.7	-104 50.2	-59 47.0	-108 34.3	-59 04.9	-112 55.1
32	59 00.5	105 43.8	58 27.4	109 36.2	57 35.8	114 14.9
34	57 42.9	106 46.8	57 02.4	110 52.4	55 55.4	116 02.8
11 35	-57 02.4	-107 22.6	-56 17.0	-111 37.6	-54 58.0	-117 14.2
36	56 20.6	108 01.9	55 29.1	112 29.3	53 51.6	118 47.0
37	55 37.0	108 45.2	54 37.6	113 29.3	-52 24.7	-121 08.2
38	54 51.4	109 33.6	53 41.2	114 41.1	.. ..	.. ..
39	54 03.1	110 28.5	52 36.7	116 12.0	.. ..	.. ..
40	53 11.2	111 31.7	51 15.6	118 21.5	.. ..	.. ..
Limit	-47 27	-121 14	-48 48	-123 16	-50 15	-125 34

ANNULAR SOLAR ECLIPSE OF 16 JANUARY 1972

CENTRAL LINE OF ANNULAR PHASE

Universal Time	10,000 Feet				20,000 Feet				30,000 Feet				40,000 Feet			
	h	m	Latitude ° ' "	Longitude ° ' "	Latitude ° ' "	Longitude ° ' "	Latitude ° ' "	Longitude ° ' "	Latitude ° ' "	Longitude ° ' "	Latitude ° ' "	Longitude ° ' "	Latitude ° ' "	Longitude ° ' "	Latitude ° ' "	Longitude ° ' "
10 25			-71 11.4	+142 11.8	-71 43.3	+141 52.2	-72 10.4	+141 34.7	-72 34.4	+141 18.5			-72 34.4	+141 18.5		
26			73 48.0	142 25.2	74 05.2	142 13.0	74 21.5	142 01.1	74 37.1	141 49.4			74 37.1	141 49.4		
27			75 29.4	143 20.6	75 42.6	143 10.8	75 55.4	143 01.0	76 07.9	142 51.3			76 07.9	142 51.3		
28			76 50.0	144 41.6	77 01.2	144 33.4	77 12.1	144 25.1	77 22.8	144 16.8			77 22.8	144 16.8		
29			77 58.3	146 25.3	78 08.2	146 18.5	78 17.9	146 11.7	78 27.5	146 04.8			78 27.5	146 04.8		
10 30			-78 57.8	+148 31.8	-79 06.9	+148 26.6	-79 15.8	+148 21.3	-79 24.5	+148 15.9			-79 24.5	+148 15.9		
32			80 37.4	153 58.7	80 45.2	153 57.4	80 53.0	153 56.0	81 00.6	153 54.6			81 00.6	153 54.6		
34			81 55.3	161 16.6	82 02.3	161 21.0	82 09.2	161 25.4	82 16.1	161 30.0			82 16.1	161 30.0		
36			82 53.0	+170 35.9	82 59.3	+170 48.2	83 05.5	+171 00.7	83 11.6	+171 13.6			83 11.6	+171 13.6		
38			83 29.8	-178 14.4	83 35.3	-177 52.7	83 40.7	-177 30.5	83 46.1	-177 07.9			83 46.1	-177 07.9		
10 40			-83 45.0	-166 02.4	-83 49.6	-165 32.0	-83 54.2	-165 01.1	-83 58.7	-164 29.6			-83 58.7	-164 29.6		
42			83 39.6	154 04.4	83 43.3	153 28.7	83 47.0	152 52.5	83 50.6	152 15.8			83 50.6	152 15.8		
44			83 17.0	143 27.9	83 19.8	142 50.8	83 22.6	142 13.5	83 25.4	141 35.8			83 25.4	141 35.8		
46			82 41.3	134 43.3	82 43.5	134 07.7	82 45.6	133 32.0	82 47.7	132 56.2			82 47.7	132 56.2		
48			81 56.7	127 48.4	81 58.3	127 15.6	81 59.9	126 42.8	82 01.5	126 10.0			82 01.5	126 10.0		
10 50			-81 06.0	-122 26.0	-81 07.3	-121 56.3	-81 08.5	-121 26.6	-81 09.7	-120 57.0			-81 09.7	-120 57.0		
52			80 11.5	118 16.4	80 12.5	117 49.6	80 13.5	117 22.8	80 14.4	116 56.2			80 14.4	116 56.2		
54			79 14.5	115 02.5	79 15.3	114 38.3	79 16.0	114 14.2	79 16.7	113 50.0			79 16.7	113 50.0		
56			78 15.7	112 31.4	78 16.4	112 09.4	78 17.0	111 47.4	78 17.6	111 25.5			78 17.6	111 25.5		
58			77 15.9	110 33.3	77 16.5	110 13.1	77 17.0	109 52.9	77 17.5	109 32.9			77 17.5	109 32.9		
11 00			-76 15.3	-109 00.9	-76 15.8	-108 42.2	-76 16.3	-108 23.6	-76 16.8	-108 05.1			-76 16.8	-108 05.1		
02			75 14.2	107 48.9	75 14.7	107 31.5	75 15.1	107 14.2	75 15.6	106 57.0			75 15.6	106 57.0		
04			74 12.6	106 53.3	74 13.1	106 37.1	74 13.5	106 20.9	74 14.0	106 04.7			74 14.0	106 04.7		
06			73 10.6	106 11.3	73 11.1	105 56.0	73 11.6	105 40.7	73 12.1	105 25.5			73 12.1	105 25.5		
08			72 08.3	105 40.6	72 08.8	105 26.1	72 09.3	105 11.6	72 09.8	104 57.1			72 09.8	104 57.1		
11 10			-71 05.5	-105 19.6	-71 06.1	-105 05.7	-71 06.7	-104 51.9	-71 07.2	-104 38.1			-71 07.2	-104 38.1		
12			70 02.4	105 07.1	70 03.0	104 53.7	70 03.6	104 40.4	70 04.2	104 27.2			70 04.2	104 27.2		
14			68 58.7	105 02.0	68 59.4	104 49.2	69 00.1	104 36.3	69 00.8	104 23.5			69 00.8	104 23.5		
16			67 54.3	105 04.0	67 55.1	104 51.4	67 55.9	104 39.0	67 56.7	104 26.5			67 56.7	104 26.5		
18			66 49.2	105 12.4	66 50.1	105 00.1	66 51.0	104 47.9	66 51.9	104 35.8			66 51.9	104 35.8		
11 20			-65 43.2	-105 27.0	-65 44.2	-105 15.0	-65 45.2	-105 03.0	-65 46.2	-104 51.1			-65 46.2	-104 51.1		
22			64 36.0	105 47.9	64 37.2	105 36.0	64 38.3	105 24.2	64 39.4	105 12.4			64 39.4	105 12.4		
24			63 27.4	106 15.2	63 28.7	106 03.4	63 30.0	105 51.6	63 31.3	105 39.9			63 31.3	105 39.9		
26			62 17.1	106 49.5	62 18.6	106 37.5	62 20.0	106 25.7	62 21.5	106 13.9			62 21.5	106 13.9		
28			61 04.5	107 31.2	61 06.2	107 19.1	61 07.9	107 07.1	61 09.6	106 55.2			61 09.6	106 55.2		
11 30			-59 49.1	-108 21.8	-59 51.1	-108 09.4	-59 53.1	-107 57.1	-59 55.0	-107 44.9			-59 55.0	-107 44.9		
32			58 29.9	109 23.1	58 32.3	109 10.2	58 34.6	108 57.4	58 36.9	108 44.7			58 36.9	108 44.7		
34			57 05.3	110 38.5	57 08.3	110 24.7	57 11.1	110 11.0	57 13.9	109 57.5			57 13.9	109 57.5		
11 36			-55 32.9	-112 13.8	-55 36.5	-111 58.4	-55 40.1	-111 43.4	-55 43.7	-111 28.4			-55 43.7	-111 28.4		
37			54 42.1	113 12.4	54 46.3	112 55.9	54 50.5	112 39.7	54 54.6	112 23.7			54 54.6	112 23.7		
38			53 46.5	114 22.4	53 51.7	114 04.0	53 56.7	113 46.0	54 01.5	113 28.4			54 01.5	113 28.4		
39			52 43.6	115 49.7	52 50.2	115 28.2	52 56.5	115 07.4	53 02.5	114 47.2			53 02.5	114 47.2		
40			-51 26.3	-117 50.8	51 36.0	117 22.2	51 44.9	116 55.4	51 53.2	116 30.0			51 53.2	116 30.0		
41					-49 37.1	-121 00.2	-50 00.7	-119 59.4	-50 18.2	-119 13.0			-50 18.2	-119 13.0		

DURATION OF ANNULAR PHASE AND WIDTH OF PATH ON CENTRAL LINE

Universal Time h m	10,000 Feet		20,000 Feet		30,000 Feet		40,000 Feet	
	Duration m s	Width of Path mi	Duration m s	Width of Path mi	Duration m s	Width of Path mi	Duration m s	Width of Path mi
10 25	1 55.3	263	1 55.2	260	1 55.1	258	1 55.0	255
26	1 54.8	253	1 54.7	251	1 54.7	248	1 54.6	247
27	1 54.4	246	1 54.4	244	1 54.3	242	1 54.3	240
28	1 54.2	239	1 54.1	238	1 54.1	237	1 54.0	235
29	1 53.9	235	1 53.9	233	1 53.8	232	1 53.8	230
10 30	1 53.7	231	1 53.7	229	1 53.6	228	1 53.6	226
32	1 53.3	224	1 53.3	222	1 53.3	221	1 53.2	219
34	1 53.0	217	1 53.0	217	1 52.9	215	1 52.9	214
36	1 52.7	213	1 52.7	211	1 52.7	210	1 52.6	209
38	1 52.4	209	1 52.4	207	1 52.4	206	1 52.4	206
10 40	1 52.2	205	1 52.2	204	1 52.2	203	1 52.1	202
42	1 52.0	202	1 52.0	201	1 51.9	200	1 51.9	199
44	1 51.8	200	1 51.8	198	1 51.7	198	1 51.7	197
46	1 51.6	197	1 51.6	197	1 51.5	196	1 51.5	195
48	1 51.4	196	1 51.4	195	1 51.4	194	1 51.3	194
10 50	1 51.3	195	1 51.2	194	1 51.2	193	1 51.2	192
52	1 51.1	194	1 51.1	193	1 51.1	192	1 51.0	191
54	1 51.0	193	1 50.9	193	1 50.9	192	1 50.9	191
56	1 50.8	193	1 50.8	192	1 50.8	191	1 50.8	191
58	1 50.7	193	1 50.7	192	1 50.7	191	1 50.7	191
11 00	1 50.6	193	1 50.6	193	1 50.6	192	1 50.6	191
02	1 50.6	194	1 50.5	194	1 50.5	192	1 50.5	191
04	1 50.5	195	1 50.5	194	1 50.5	194	1 50.4	192
06	1 50.5	196	1 50.4	195	1 50.4	194	1 50.4	194
08	1 50.4	197	1 50.4	197	1 50.4	196	1 50.4	195
11 10	1 50.4	199	1 50.4	198	1 50.3	198	1 50.3	197
12	1 50.4	201	1 50.4	201	1 50.3	199	1 50.3	199
14	1 50.4	204	1 50.4	202	1 50.3	202	1 50.3	201
16	1 50.4	206	1 50.4	205	1 50.3	204	1 50.3	203
18	1 50.4	209	1 50.4	208	1 50.4	207	1 50.4	206
11 20	1 50.5	213	1 50.5	211	1 50.4	210	1 50.4	210
22	1 50.6	216	1 50.5	215	1 50.5	214	1 50.5	213
24	1 50.7	220	1 50.6	219	1 50.6	217	1 50.6	217
26	1 50.8	224	1 50.8	223	1 50.7	222	1 50.7	221
28	1 50.9	229	1 50.9	228	1 50.9	226	1 50.8	226
11 30	1 51.1	234	1 51.1	232	1 51.0	232	1 51.0	230
32	1 51.3	239	1 51.3	238	1 51.2	237	1 51.2	235
34	1 51.6	245	1 51.5	244	1 51.5	242	1 51.5	241
11 36	1 51.9	251	1 51.9	249	1 51.8	248	1 51.8	247
37	1 52.1	254	1 52.1	252	1 52.0	251	1 52.0	250
38	1 52.4	257	1 52.3	255	1 52.3	254	1 52.2	253
39	1 52.6	260	1 52.6	259	1 52.5	257	1 52.5	256
40	1 53.0	263	1 53.0	262	1 52.9	260	1 52.8	259
41	• • • •	• • •	1 53.6	265	1 53.4	264	1 53.3	262

CENTRAL LINE OF ANNULAR PHASE

Universal Time	80 Km				100 Km				200 Km				300 Km			
	h	m	Latitude °	Longitude °	Latitude °	Longitude °	Latitude °	Longitude °	Latitude °	Longitude °	Latitude °	Longitude °	Latitude °	Longitude °	Latitude °	Longitude °
10 12	..	..	..	..	..	..	..	..	..	..	..	..	-69	43.1	+121	17.4
14	..	..	..	..	..	..	..	..	..	..	..	..	74	05.1	117	08.9
16	..	..	..	..	..	..	..	..	-70	11.7	+127	26.1	76	46.8	114	54.9
18	..	..	..	..	..	..	..	..	74	42.0	124	35.0	78	57.0	113	18.1
10 20	..	..	..	..	..	..	..	..	-77	25.0	+123	44.6	-80	50.0	+112	02.9
22	-72	56.6	+135	14.0	-74	38.3	+133	18.2	79	35.4	123	49.6	82	31.8	111	04.2
24	76	20.7	135	36.8	77	27.1	134	03.3	81	27.6	124	46.9	84	05.5	110	21.1
26	78	43.0	137	31.4	79	36.8	136	07.4	83	07.4	126	51.3	85	33.2	109	57.6
28	80	37.6	140	50.5	81	24.5	139	37.2	84	37.4	130	38.9	86	55.9	110	08.4
10 30	-82	13.3	+145	53.7	-82	55.9	+144	59.8	-85	57.8	+137	30.7	-88	14.7	+111	55.4
32	83	32.6	153	16.4	84	12.1	153	01.0	87	05.9	150	30.3	89	29.1	+126	10.8
34	84	34.5	163	42.5	85	11.0	+164	38.7	87	51.3	+175	15.2	89	14.5	-89	56.6
36	85	15.6	+177	35.5	85	47.9	-179	39.3	87	55.4	-150	07.6	88	04.7	81	57.1
38	85	32.0	-166	04.4	85	57.9	161	29.1	87	19.2	124	18.5	86	56.2	80	31.9
10 40	-85	23.1	-149	58.4	-85	41.8	-144	29.8	-86	24.6	-110	31.0	-85	49.4	-80	13.8
42	84	53.7	136	33.6	85	06.0	131	13.5	85	23.6	103	04.1	84	44.0	80	18.5
44	84	10.7	126	29.1	84	18.2	121	44.7	84	20.7	98	42.6	83	40.0	80	33.1
46	83	19.5	119	12.3	83	23.8	115	06.8	83	17.3	95	59.4	82	37.2	80	53.0
48	82	23.6	113	57.5	82	25.9	110	25.7	82	14.3	94	13.0	81	35.4	81	15.7
10 50	-81	25.1	-110	08.0	-81	26.1	-107	03.6	-81	11.7	-93	02.1	-80	34.5	-81	40.2
52	80	25.3	107	18.4	80	25.4	104	35.8	80	09.7	92	14.7	79	34.4	82	05.8
54	79	24.6	105	11.5	79	24.3	102	46.3	79	08.3	91	43.7	78	35.1	82	32.2
56	78	23.6	103	35.8	78	23.0	101	24.6	78	07.4	91	24.4	77	36.4	82	59.1
58	77	22.5	102	23.5	77	21.8	100	23.7	77	07.0	91	14.0	76	38.2	83	26.5
11 00	-76	21.2	-101	29.2	-76	20.6	-99	38.7	-76	07.0	-91	10.5	-75	40.4	-83	54.3
02	75	20.0	100	49.0	75	19.5	99	06.3	75	07.4	91	12.4	74	43.1	84	22.6
04	74	18.8	100	20.1	74	18.5	98	43.9	74	08.1	91	18.8	73	46.1	84	51.3
06	73	17.6	100	00.6	73	17.6	98	29.8	73	09.0	91	29.0	72	49.3	85	20.4
08	72	16.3	99	48.8	72	16.6	98	22.6	72	10.1	91	42.4	71	52.7	85	50.1
11 10	-71	14.9	-99	43.8	-71	15.6	-98	21.4	-71	11.2	-91	58.7	-70	56.3	-86	20.4
12	70	13.3	99	44.6	70	14.5	98	25.6	70	12.3	92	17.6	69	59.9	86	51.5
14	69	11.4	99	50.8	69	13.1	98	34.5	69	13.4	92	39.1	69	03.4	87	23.2
16	68	09.2	100	01.8	68	11.4	98	47.8	68	14.3	93	03.0	68	06.9	87	55.9
18	67	06.5	100	17.5	67	09.2	99	05.4	67	15.0	93	29.2	67	10.3	88	29.6
11 20	-66	03.1	-100	37.7	-66	06.6	-99	27.0	-66	15.3	-93	57.9	-66	13.3	-89	04.4
22	64	59.0	101	02.3	65	03.2	99	52.7	65	15.2	94	29.0	65	16.1	89	40.5
24	63	54.0	101	31.6	63	58.9	100	22.7	64	14.5	95	02.8	64	18.4	90	18.1
26	62	47.7	102	05.8	62	53.6	100	57.1	63	13.1	95	39.4	63	20.3	90	57.3
28	61	40.0	102	45.2	61	46.9	101	36.4	62	10.8	96	19.1	62	21.5	91	38.5
11 30	-60	30.5	-103	30.6	-60	38.6	-102	21.1	-61	07.4	-97	02.3	-61	21.9	-92	21.9
32	59	18.6	104	22.8	59	28.2	103	12.0	60	02.6	97	49.5	60	21.3	93	07.9
34	58	03.8	105	23.4	58	15.1	104	10.3	58	56.2	98	41.2	59	19.6	93	56.8
36	56	45.0	106	34.5	56	58.5	105	17.9	57	47.8	99	38.4	58	16.6	94	49.3
38	55	20.5	107	59.7	55	37.2	106	37.7	56	36.8	100	42.3	57	11.9	95	46.0
11 40	-53	47.4	-109	45.9	-54	08.9	-108	14.6	-55	22.5	-101	54.6	-56	05.1	-96	47.8
42	51	59.0	112	08.7	52	29.1	110	19.0	54	03.6	103	18.0	54	55.7	97	55.9
44	-49	28.9	-116	10.1	-50	25.4	-113	20.1	52	38.1	104	57.2	53	42.9	99	12.2
46	..	..	..	..	..	..	..	..	51	02.4	107	01.2	52	25.6	100	39.3
48	..	..	..	..	..	..	..	..	-49	06.3	-109	53.4	51	01.8	102	21.9
11 50	..	..	..	..	..	..	..	..	..	..	..	..	-49	27.7	-104	28.9
52	..	..	..	..	..	..	..	..	..	..	..	..	47	33.8	107	23.1
54	..	..	..	..	..	..	..	..	..	..	..	..	-44	05.5	-114	03.8

DURATION OF ANNULAR PHASE AND WIDTH OF PATH ON CENTRAL LINE

Universal Time	80 Km		100 Km		200 Km		300 Km	
	Duration	Width of Path	Duration	Width of Path	Duration	Width of Path	Duration	Width of Path
h m	m s	mi	m s	mi	m s	mi	m s	mi
10 12	• • • •	• • •	• • • •	• • •	• • • •	• • •	1 55.3	205
14	• • • •	• • •	• • • •	• • •	• • • •	• • •	1 54.4	192
16	• • • •	• • •	• • • •	• • •	1 55.3	220	1 53.8	183
18	• • • •	• • •	• • • •	• • •	1 54.4	205	1 53.3	177
10 20	• • • •	• • •	• • • •	• • •	1 53.8	196	1 52.9	172
22	1 54.9	236	1 54.5	225	1 53.4	189	1 52.5	167
24	1 54.2	222	1 54.0	214	1 53.0	184	1 52.2	163
26	1 53.7	213	1 53.5	207	1 52.6	179	1 51.9	159
28	1 53.3	207	1 53.1	200	1 52.3	175	1 51.6	157
10 30	1 53.0	201	1 52.8	195	1 52.0	172	1 51.3	154
32	1 52.6	197	1 52.5	191	1 51.7	168	1 51.1	152
34	1 52.4	193	1 52.2	187	1 51.5	166	1 50.8	150
36	1 52.1	189	1 52.0	184	1 51.3	163	1 50.6	148
38	1 51.9	186	1 51.7	181	1 51.0	161	1 50.4	147
10 40	1 51.6	184	1 51.5	179	1 50.8	159	1 50.2	145
42	1 51.4	181	1 51.3	177	1 50.6	158	1 50.0	144
44	1 51.2	180	1 51.1	176	1 50.4	157	1 49.8	143
46	1 51.0	178	1 50.9	174	1 50.3	156	1 49.6	142
48	1 50.9	177	1 50.7	172	1 50.1	155	1 49.5	142
10 50	1 50.7	176	1 50.6	171	1 49.9	155	1 49.3	141
52	1 50.6	175	1 50.4	171	1 49.8	154	1 49.2	141
54	1 50.4	175	1 50.3	171	1 49.7	154	1 49.1	140
56	1 50.3	175	1 50.2	171	1 49.6	154	1 48.9	140
58	1 50.2	175	1 50.1	171	1 49.4	154	1 48.8	140
11 00	1 50.1	175	1 50.0	171	1 49.3	154	1 48.7	141
02	1 50.0	176	1 49.9	171	1 49.3	155	1 48.7	141
04	1 50.0	177	1 49.8	172	1 49.2	155	1 48.6	142
06	1 49.9	177	1 49.8	173	1 49.1	155	1 48.5	142
08	1 49.9	178	1 49.7	174	1 49.1	156	1 48.4	143
11 10	1 49.8	180	1 49.7	176	1 49.1	158	1 48.4	144
12	1 49.8	181	1 49.7	177	1 49.0	159	1 48.4	145
14	1 49.8	183	1 49.7	179	1 49.0	160	1 48.4	146
16	1 49.8	185	1 49.7	181	1 49.0	162	1 48.4	147
18	1 49.9	188	1 49.7	183	1 49.0	163	1 48.4	149
11 20	1 49.9	190	1 49.8	185	1 49.1	165	1 48.4	150
22	1 50.0	193	1 49.8	188	1 49.1	168	1 48.4	152
24	1 50.0	197	1 49.9	191	1 49.2	170	1 48.5	154
26	1 50.1	200	1 50.0	194	1 49.2	172	1 48.5	156
28	1 50.3	203	1 50.1	198	1 49.3	175	1 48.6	159
11 30	1 50.4	207	1 50.2	202	1 49.4	178	1 48.7	161
32	1 50.6	212	1 50.4	206	1 49.6	181	1 48.8	163
34	1 50.8	216	1 50.6	210	1 49.7	185	1 48.9	166
36	1 51.0	221	1 50.8	215	1 49.9	189	1 49.1	169
38	1 51.3	226	1 51.1	220	1 50.1	192	1 49.3	173
11 40	1 51.7	232	1 51.5	225	1 50.4	197	1 49.5	176
42	1 52.2	238	1 51.9	230	1 50.7	201	1 49.7	179
44	1 53.0	243	1 52.5	236	1 51.0	206	1 50.0	183
46	• • • •	• • •	• • • •	• • •	1 51.5	210	1 50.3	188
48	• • • •	• • •	• • • •	• • •	1 52.1	216	1 50.7	192
11 50	• • • •	• • •	• • • •	• • •	• • • •	• • •	1 51.2	196
52	• • • •	• • •	• • • •	• • •	• • • •	• • •	1 51.9	201
54	• • • •	• • •	• • • •	• • •	• • • •	• • •	1 53.3	207

LOCAL CIRCUMSTANCES FOR POINTS ON CENTRAL LINE

Universal Time	Central Line		First Contact				Second Contact			
	Latitude	Longitude	Universal Time	P	V		Universal Time	P	V	
h m	° '	° '	h m s	°	°		h m s	°	°	
10 25	-70 30.8	+142 35.2	9 31 38.5	256	77		10 24 02.3	257	73	
26	73 29.7	142 37.6	9 31 34.9	256	77		10 25 02.6	256	73	
27	75 15.7	143 30.4	9 31 56.3	256	76		10 26 02.8	256	73	
28	76 38.5	144 49.8	9 32 25.6	256	77		10 27 02.9	256	74	
29	77 48.1	146 32.0	9 32 59.3	255	77		10 28 03.0	256	74	
10 30	-78 48.6	+148 37.0	9 33 36.1	255	77		10 29 03.1	255	74	
32	80 29.5	154 00.0	9 34 55.6	255	77		10 31 03.3	255	75	
34	81 48.2	161 12.3	9 36 20.9	255	77		10 33 03.5	255	76	
36	82 46.7	+170 23.9	9 37 50.3	254	78		10 35 03.7	254	76	
38	83 24.2	-178 35.6	9 39 23.2	254	78		10 37 03.8	254	77	
10 40	-83 40.3	-166 32.2	9 40 58.9	254	79		10 39 03.9	254	78	
42	83 35.8	154 39.6	9 42 37.0	254	80		10 41 04.0	254	79	
44	83 14.0	144 04.6	9 44 17.2	253	80		10 43 04.1	253	79	
46	82 39.0	135 18.7	9 45 59.5	253	81		10 45 04.2	253	80	
48	81 55.0	128 21.1	9 47 43.5	253	81		10 47 04.3	253	81	
10 50	-81 04.7	-122 55.7	9 49 29.4	253	82		10 49 04.4	253	82	
52	80 10.5	118 43.2	9 51 16.9	252	83		10 51 04.4	252	83	
54	79 13.6	115 26.8	9 53 06.1	252	84		10 53 04.5	252	84	
56	78 15.1	112 53.5	9 54 56.8	252	84		10 55 04.6	252	85	
58	77 15.3	110 53.6	9 56 49.0	252	85		10 57 04.6	252	85	
11 00	-76 14.8	-109 19.6	9 58 42.8	251	86		10 59 04.7	252	86	
02	75 13.6	108 06.3	10 00 38.1	251	87		11 01 04.7	251	87	
04	74 12.1	107 09.7	10 02 35.0	251	88		11 03 04.7	251	88	
06	73 10.1	106 26.7	10 04 33.3	251	89		11 05 04.7	251	89	
08	72 07.7	105 55.2	10 06 33.2	251	90		11 07 04.8	251	90	
11 10	-71 04.9	-105 33.6	10 08 34.7	250	91		11 09 04.8	251	91	
12	70 01.7	105 20.5	10 10 37.9	250	92		11 11 04.8	251	92	
14	68 57.9	105 15.0	10 12 42.6	250	93		11 13 04.8	251	93	
16	67 53.5	105 16.5	10 14 49.1	250	94		11 15 04.8	250	94	
18	66 48.3	105 24.6	10 16 57.4	250	95		11 17 04.7	250	95	
11 20	-65 42.1	-105 39.1	10 19 07.6	250	96		11 19 04.7	250	96	
22	64 34.8	105 59.9	10 21 19.9	250	97		11 21 04.7	250	97	
24	63 26.1	106 27.2	10 23 34.4	249	98		11 23 04.7	250	98	
26	62 15.5	107 01.4	10 25 51.3	249	100		11 25 04.6	250	99	
28	61 02.7	107 43.4	10 28 11.0	249	101		11 27 04.5	250	100	
11 30	-59 47.0	-108 34.3	10 30 33.8	249	102		11 29 04.4	250	101	
32	58 27.4	109 36.2	10 33 00.5	249	103		11 31 04.3	250	102	
34	57 02.4	110 52.4	10 35 32.0	249	105		11 33 04.2	250	103	
11 35	-56 17.0	-111 37.6	10 36 50.2	249	105		11 34 04.1	250	104	
36	55 29.1	112 29.3	10 38 10.4	249	106		11 35 04.0	250	104	
37	54 37.6	113 29.3	10 39 33.2	249	107		11 36 03.9	250	105	
38	53 41.2	114 41.1	10 40 59.6	249	107		11 37 03.8	250	105	
39	52 36.7	116 12.0	10 42 31.8	249	108		11 38 03.7	250	106	
40	-51 15.6	-118 21.5	10 44 15.2	250	109		11 39 03.4	250	107	

ANNULAR SOLAR ECLIPSE OF 16 JANUARY 1972

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LOCAL CIRCUMSTANCES FOR POINTS ON CENTRAL LINE

Maximum Eclipse				Third Contact				Fourth Contact				Duration	Width of Path
Universal Time	Magnitude	Sun's Alt.	Sun's Az.	Universal Time	P	V	Universal Time	P	V	m	s		
h m s		°	°	h m s	°	°	h m s	°	°				mi
10 25 00.0	0.965	2	169	10 25 57.7	77	253	11 18 48.1	77	249	1	55.4	267	
10 26 00.0	0.966	5	169	10 26 57.4	76	253	11 20 49.4	76	249	1	54.8	255	
10 27 00.0	0.966	6	170	10 27 57.2	76	253	11 22 25.3	76	250	1	54.4	247	
10 28 00.0	0.966	8	171	10 28 57.1	76	253	11 23 53.1	76	250	1	54.2	242	
10 29 00.0	0.967	9	172	10 29 57.0	76	254	11 25 16.3	76	251	1	54.0	236	
10 30 00.0	0.967	10	174	10 30 56.9	75	254	11 26 36.5	76	251	1	53.8	232	
10 32 00.0	0.967	11	178	10 32 56.7	75	255	11 29 10.4	75	252	1	53.4	224	
10 34 00.0	0.968	13	185	10 34 56.5	75	255	11 31 38.2	75	253	1	53.0	219	
10 36 00.0	0.968	14	193	10 36 56.3	74	256	11 34 01.5	75	254	1	52.6	213	
10 38 00.0	0.968	15	203	10 38 56.2	74	257	11 36 21.3	74	255	1	52.4	209	
10 40 00.0	0.969	16	215	10 40 56.1	74	258	11 38 38.1	74	256	1	52.2	206	
10 42 00.0	0.969	17	226	10 42 56.0	74	259	11 40 52.4	74	257	1	52.0	203	
10 44 00.0	0.969	17	235	10 44 55.9	73	259	11 43 04.4	74	258	1	51.8	201	
10 46 00.0	0.969	18	243	10 46 55.8	73	260	11 45 14.3	73	259	1	51.6	199	
10 48 00.0	0.969	18	249	10 48 55.7	73	261	11 47 22.4	73	260	1	51.4	197	
10 50 00.0	0.970	19	254	10 50 55.6	73	262	11 49 28.7	73	261	1	51.2	196	
10 52 00.0	0.970	19	257	10 52 55.6	72	263	11 51 33.4	73	262	1	51.2	195	
10 54 00.0	0.970	19	259	10 54 55.5	72	264	11 53 36.5	72	263	1	51.0	194	
10 56 00.0	0.970	20	261	10 56 55.4	72	265	11 55 38.1	72	264	1	50.8	194	
10 57 59.9	0.970	20	262	10 58 55.3	72	265	11 57 38.2	72	265	1	50.7	194	
11 00 00.0	0.970	20	263	11 00 55.3	72	266	11 59 37.0	72	266	1	50.6	194	
11 02 00.0	0.970	20	263	11 02 55.3	71	267	12 01 34.4	72	267	1	50.6	195	
11 04 00.0	0.970	20	263	11 04 55.3	71	268	12 03 30.4	72	267	1	50.6	196	
11 06 00.0	0.970	20	263	11 06 55.3	71	269	12 05 25.2	71	268	1	50.6	197	
11 08 00.0	0.970	20	263	11 08 55.2	71	270	12 07 18.5	71	269	1	50.4	198	
11 10 00.0	0.970	20	262	11 10 55.2	71	271	12 09 10.7	71	270	1	50.4	201	
11 12 00.0	0.970	19	262	11 12 55.2	71	272	12 11 01.4	71	271	1	50.4	202	
11 14 00.0	0.970	19	261	11 14 55.2	71	273	12 12 50.8	71	272	1	50.4	205	
11 16 00.0	0.970	19	260	11 16 55.2	70	274	12 14 38.8	71	273	1	50.4	207	
11 18 00.0	0.970	18	259	11 18 55.3	70	275	12 16 25.4	71	273	1	50.6	210	
11 20 00.0	0.969	18	258	11 20 55.3	70	276	12 18 10.5	71	274	1	50.6	213	
11 22 00.0	0.969	17	257	11 22 55.3	70	277	12 19 53.9	71	275	1	50.6	217	
11 24 00.0	0.969	16	256	11 24 55.3	70	278	12 21 35.7	71	276	1	50.6	221	
11 26 00.0	0.969	16	255	11 26 55.4	70	279	12 23 15.6	71	277	1	50.8	225	
11 28 00.0	0.969	15	253	11 28 55.5	70	280	12 24 53.3	71	278	1	51.0	230	
11 30 00.0	0.968	14	252	11 30 55.6	70	281	12 26 28.5	71	278	1	51.2	235	
11 32 00.0	0.968	13	250	11 32 55.7	70	282	12 28 00.8	71	279	1	51.4	240	
11 34 00.0	0.968	11	249	11 34 55.8	70	283	12 29 29.1	71	280	1	51.6	247	
11 35 00.0	0.968	10	248	11 35 55.9	70	283	12 30 11.3	71	280	1	51.8	249	
11 36 00.0	0.967	10	247	11 36 56.0	70	284	12 30 52.0	71	281	1	52.0	252	
11 37 00.0	0.967	9	246	11 37 56.1	70	285	12 31 30.4	71	281	1	52.2	255	
11 38 00.0	0.967	7	244	11 38 56.2	70	285	12 32 05.9	71	282	1	52.4	258	
11 39 00.0	0.966	6	243	11 39 56.3	70	286	.. .. .	...	...	1	52.6	262	
11 40 00.0	0.966	4	241	11 40 56.6	70	286	.. .. .	...	...	1	53.2	265	

LOCAL CIRCUMSTANCES

Geographic Locations	Latitude Longitude		First Contact			Second Contact		
			Universal			Universal		
			Time	P	V	Time	P	V
	° ' "	° ' "	h m s	°	°	h m s	°	°
Adelaide Island, U.K.*	-67 46.0	+ 68 54.0	8 58 47.3	239	38			
Albany, Aust.	-34 57.0	-117 54.0	11 09 36.2	239	113			
Almirante Brown Base, Arg.*	-64 53.0	+ 62 53.0	8 54 50.6	234	31			
Amundsen-Scott, U.S.A.*	-90 00.0	0 00.0	9 32 43.4	249	69			
Argentine Islands, U.K.*	-65 15.0	+ 64 16.0	8 55 21.9	235	32			
Bellingshausen, U.S.S.R.*	-62 12.0	+ 58 56.0	8 51 58.2	231	24			
Brockton, U.S.A.*	-80 01.0	+178 02.0	9 41 56.6	256	82			
Bunbury, Aust.	-33 20.0	-115 34.0	11 13 13.4	237	112			
Byrd, U.S.A.*	-80 01.0	+119 32.0	9 24 58.7	252	69			
Cape Bird, N.Z.*	-77 14.0	-166 28.0	9 49 18.9	257	87			
Cape Royds, N.Z.*	-77 36.0	-166 10.0	9 48 55.9	257	87			
CAPT Arturo Prat Base, Chile*	-62 30.0	+ 59 41.0	8 52 16.1	231	25			
Casey, Aust.*	-66 17.0	-110 32.0	10 18 08.2	251	97			
CMDR Guesalaga Subbase, Chile*	-67 47.0	+ 68 53.0	8 58 48.4	239	38			
Davis, Aust.*	-68 35.0	- 77 58.0	10 07 24.2	242	81			
Decepción, Arg.*	-62 59.0	+ 60 43.0	8 52 46.3	232	26			
Deception Island, U.K.*	-62 59.0	+ 60 34.0	8 52 45.8	232	26			
Dumont d'Urville, France*	-66 40.0	-140 01.0	10 12 49.4	257	100			
Esperanza, Arg.*	-63 24.0	+ 56 59.0	8 53 05.3	231	25			
Fossil Bluff, U.K.*	-71 20.0	+ 68 17.0	9 03 06.2	241	43			
GRAL Belgrano Base, Arg.*	-77 58.0	+ 38 48.0	9 13 06.5	240	47			
GRAL B. O'Higgins Base, Chile*	-63 19.0	+ 57 54.0	8 53 00.5	231	25			
Hallett, U.S.A.*	-72 18.0	-170 18.0	9 53 55.7	259	91			
Halley Bay, U.K.*	-75 31.0	+ 26 36.0	9 12 00.2	236	41			
Katanning, Aust.	-33 43.0	-117 32.0	11 11 35.9	238	112			
Mawson, Aust.*	-67 36.0	- 62 53.0	10 02 24.0	236	71			
McMurdo, U.S.A.*	-77 51.0	-166 37.0	9 48 29.4	257	86			
Mirnyy, U.S.S.R.*	-66 33.0	- 93 01.0	10 15 46.7	246	90			
Molodezhnaya, U.S.S.R.*	-67 40.0	- 45 51.0	9 52 03.2	231	57			
Novolazarevskaya, U.S.S.R.*	-70 46.0	- 11 50.0	9 26 26.1	228	37			
Orcadas, Arg.*	-60 45.0	+ 44 43.0	8 52 22.0	223	13			
Palmer, U.S.A.*	-64 46.0	+ 64 05.0	8 54 50.0	235	31			
Petrel Air Station, Arg.*	-63 28.0	+ 56 17.0	8 53 09.7	231	25			
Perth, Aust.	-31 58.0	-115 49.0	11 15 06.7	236	112			
PDTE E. Frei Montalva Base, Chile*	-62 12.0	+ 58 56.0	8 51 58.2	231	24			
PDTE G. Videla Base, Chile*	-64 49.0	+ 62 51.0	8 54 46.2	234	31			
PDTE P. Aquirre Cerda Base, Chile*	-62 56.0	+ 60 36.0	8 52 43.1	232	26			
Puerto Aisen, Chile	-45 27.0	+ 72 58.0	.. .. .	...	...			
Puerto Natales, Chile	-51 41.0	+ 72 15.0	.. .. .	...	...			
Punta Arenas, Chile	-53 10.0	+ 70 56.0	.. .. .	...	...			
Rawson, Chubut, Arg.	-43 15.0	+ 65 53.0	.. .. .	...	...			
Rio Gallegos, Arg.	-51 35.0	+ 69 15.0	.. .. .	...	...			
Sanae, South Africa*	-70 19.0	+ 2 22.0	9 17 44.6	228	31			
Sarmiento, Chubut, Arg.	-45 38.0	+ 69 08.0	.. .. .	...	...			
Scott Base, N.Z.*	-77 51.0	-166 46.0	9 48 27.0	257	86			
Signy Island, U.K.*	-60 43.0	+ 45 36.0	8 52 07.6	224	13			
Sobral, Arg.*	-81 04.0	+ 40 36.0	9 17 42.4	243	54			
Stanley, Falkland Is.	-51 45.0	+ 57 56.0	8 45 58.6	217	1			
Stonington Island, U.K.*	-68 11.0	+ 67 00.0	8 59 00.6	238	38			
Syowa, Japan*	-69 00.0	- 39 35.0	9 46 08.9	230	52			
Teniente Matienzo, Arg.*	-64 58.0	+ 60 02.0	8 54 44.8	234	29			
Ushuaia, Arg.	-54 48.0	+ 68 19.0	8 47 26.0	227	16			
Vanda, N.Z.*	-77 32.0	-161 30.0	9 50 15.2	257	87			
Vostok, U.S.S.R.*	-78 28.0	-106 48.0	9 54 15.6	251	83			
Wilkes Icecap Station, Aust.*	-66 30.0	-112 13.0	10 17 42.4	252	97			
Yelcho Subbase, Chile*	-64 52.0	+ 63 35.0	8 54 53.3	235	31			

* Country designation of Antarctica Bases

10 55 32.3 186 18

LOCAL CIRCUMSTANCES

Maximum Eclipse				Third Contact			Fourth Contact			Duration	Width of Path
Universal Time	Magnitude	Sun's Alt.	Sun's Az.	Universal Time	P	V	Universal Time	P	V		
h m s		°	°	h m s	°	°	h m s	°	°	m s	mi
9 54 21.2	0.655	15	110				10 52 15.8	97	253		
.. .. .	..	..	..					..	..		
9 49 16.3	0.583	16	106				10 46 18.1	102	255		
10 33 56.2	0.907	21	24				11 35 07.0	78	258		
9 49 55.7	0.595	15	107				10 47 03.3	101	254		
9 44 52.4	0.517	16	105				10 40 31.7	107	256		
10 39 06.2	0.955	12	200				11 35 58.5	73	254		
.. .. .	..	..	..					..	..		
10 22 23.6	0.923	13	148				11 20 27.8	79	252		
10 45 57.2	0.926	10	212				11 41 57.9	71	255		
.. .. .	..	..	..					..	..		
10 45 43.1	0.929	11	213				11 41 53.1	71	256		
9 45 21.4	0.526	16	105				10 41 10.5	106	256		
11 18 10.5	0.965	16	254				12 15 42.7	70	272		
9 54 22.8	0.656	15	110				10 52 17.9	97	253		
11 13 16.9	0.862	29	287				12 16 11.6	77	280		
9 46 08.6	0.540	16	106				10 42 13.2	105	256		
9 46 08.5	0.539	16	105				10 42 13.4	105	256		
11 08 21.1	0.890	7	231				12 02 18.6	68	263		
9 46 52.0	0.528	18	102				10 43 23.4	106	257		
10 00 13.1	0.703	17	107				10 59 26.2	94	253		
.. .. .	..	..	..					..	..		
10 14 33.3	0.728	25	72				11 17 26.6	90	259		
9 46 41.8	0.531	17	103				10 43 07.2	105	256		
10 48 35.5	0.898	5	208				11 42 35.8	70	255		
10 14 08.7	0.667	29	61				11 17 52.0	93	262		
.. .. .	..	..	..					..	..		
11 10 22.7	0.772	35	302				12 15 18.7	81	285		
10 45 20.9	0.931	11	213				11 41 36.1	71	255		
11 19 07.3	0.930	23	270				12 19 29.1	73	278		
11 00 58.5	0.673	40	324				12 07 27.7	87	287		
10 32 29.9	0.585	40	15				11 38 47.4	95	277		
.. .. .	..	..	..					..	..		
9 44 23.6	0.416	23	93				10 39 18.2	113	262		
9 49 08.4	0.587	15	107				10 46 01.9	102	255		
9 47 00.6	0.526	18	101				10 43 36.8	106	257		
.. .. .	..	..	..					..	..		
9 44 52.4	0.517	16	105				10 40 31.7	107	256		
9 49 09.7	0.581	16	106				10 46 09.5	102	255		
9 46 03.7	0.538	16	106				10 42 06.7	105	256		
.. .. .	..	..	..				10 06 20.3	125	262		
9 32 03.4	0.415	4	120				10 19 39.2	116	257		
9 33 29.3	0.432	5	118				10 22 17.3	114	257		
.. .. .	..	..	..					..	..		
9 20 10.0	0.198	2	118				9 55 16.5	135	268		
9 30 59.4	0.391	5	118				10 18 08.7	118	258		
10 21 41.0	0.552	38	35				11 26 48.5	98	273		
9 23 54.8	0.275	2	119				10 04 05.8	127	263		
10 45 18.0	0.931	11	212				11 41 33.0	71	255		
9 44 06.4	0.420	22	94				10 38 58.1	113	261		
10 19 20.9	0.781	24	72				11 22 02.7	87	258		
9 29 08.9	0.311	12	109				10 14 41.9	123	262		
9 54 53.0	0.653	16	108				10 53 06.6	97	254		
10 54 47.2	0.659	40	334				12 01 32.4	88	284		
.. .. .	..	..	..					..	..		
9 49 21.6	0.570	17	104				10 46 37.1	103	256		
9 34 56.3	0.443	8	116				10 24 58.1	113	257		
10 47 15.3	0.928	11	217				11 43 33.0	71	256		
10 55 54.8	0.970	21	267	10 56 17.2	138	330	11 56 06.6	73	265	0 44.9	194
11 17 28.4	0.959	16	253				12 14 48.4	70	272		
9 49 16.4	0.586	15	107				10 46 15.0	102	255		

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